

WHAT IS CLAIMED IS:

1                   1.       A method of respectively reading and writing data to and from a  
2 plurality of physical disk units in response to input/output (I/O) requests therefor from a host  
3 computing system comprising at least one processor unit, the method including the steps of:  
4                   establishing at least one logical disk group having a number of logical disk  
5 elements;  
6                   mapping each of the number of logical disk elements to a corresponding one  
7 or more of the physical disk units, each of the physical disk unit carrying the same data;  
8                   receiving from the host computing system an I/O read request for data to  
9 select a one of the number of logical elements;  
10                  accessing the physical disk unit corresponding to the selected one logical disk  
11 to access for the data; and  
12                  transferring the accessed data to the host computing system.

1                   2.       The method of claim 1, including the step of identifying a  
2 predetermined one of the logical disk elements as a master logical disk element; and  
3                   selecting the master logical disk element for all I/O write requests to write  
4 data.

1                   3.       The method of claim 2, including the step of copying data written to  
2 the one of the physical disk units corresponding to the master logical disk element to the  
3 other of the plurality of physical disk units.

1                   4.       The method of claim 1, wherein the selecting step includes selecting  
2 the one of the logical disk element on a round robin basis.

1                   5.       The method of claim 1, wherein the receiving step includes the step of  
2 determining present usage of each one of the number of physical disks having the data  
3 desired by the I/O read request to select a one of the physical disk units that is least busy.

1                   6.       A method of control of reading and writing data to and from a plurality  
2 of physical disk units in response to input/output (I/O) requests therefore from a host  
3 computing system comprising at least one processor unit, the method including the steps of:  
4                   establishing at least one logical disk group having a number of logical disk  
5 elements, each of the logical disk elements corresponding to a respective one of the logical ;

6 mapping each of the number of logical disk elements to a corresponding one  
7 or more of the physical disk units, each of the physical disk unit carrying the same data;  
8 receiving from the host computing system an I/O read request for data to  
9 select a one of the number of logical elements;  
10 accessing the physical disk unit corresponding to the selected one logical disk  
11 to access for the data; and  
12 transferring the accessed data to the host computing system.

1 7. The method of claim 6, wherein the receiving step includes the steps  
2 of:  
3 first determining a number of requests pending for each of the plurality of  
4 physical disk units;  
5 then, selecting a one of the plurality of physical disk units based upon the  
6 determining step.

1 8. A method of distributing I/O read requests for data across physical  
2 storage having multiple copies of the data, comprising the steps of:  
3 establishing a plurality of logical storage volumes;  
4 establishing a correspondence between predetermined ones of the logical  
5 volumes and each of the multiple copies of the data;  
6 receiving an I/O read request for data;  
7 assigning the I/O read request to a one of the plurality of logical volumes;  
8 reading the data from the one of the multiple copies of the data corresponding  
9 to the assigned logical storage volume from the physical storage.

1 9. The method of claim 8, wherein the assigning step includes the step of  
2 assigning the I/O read request on a round-robin basis.

1 10. The method of claim 9, wherein the assigning step includes the steps  
2 of:  
3 first performing a logical-physical mapping to determine which logical  
4 volumes correspond to which of the multiple copies of the data;  
5 selecting one of the multiple copies of the data;  
6 assigning the I/O read request to the one of the plurality of logical volumes  
7 corresponding to the selected one of the multiple copies.

1                    11.     The method of claim 10, wherein the multiple copies of the data are  
2 distributed across a number of physical storage units, and the selecting step includes the step  
3 of selecting one physical storage unit having at least one of the multiple copies of data, and  
4 assigning the I/O read request to the logical volume corresponding to one of the multiple  
5 copies of data.

1                    12.     The method of claim 11, wherein the number of physical storage units  
2 have outstanding requests to process, and the selecting step includes selecting a one of the  
3 number of the physical storage units that has a smallest number of outstanding requests to  
4 process.

1                    13.     The method of claim 8, wherein the assigning step includes assigning  
2 the I/O read request to one of a chosen few of the plurality of physical volumes.

1                    14.     The method of claim 13, wherein the multiple copies of the data are  
2 distributed across a number of physical storage units, and the assigning step includes the  
3 steps of:  
4                    selecting the physical storage unit having a small number of I/O requests to  
5 service.